

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

5 **LISTING OF CLAIMS:**

1. (Currently Amended) An electro-optical voltage sensor for measurement of an electrical voltage V, the voltage V being present between two electrodes (3, 4) and generating an electric field, the
10 electrodes (3, 4) being arranged in a manner spaced apart from one another, and an electro-optically active medium (4) being arranged between the electrodes (3, 4), into which medium light (5) can be radiated, it being possible to influence the state of polarization of said light in the electro-optically active medium (4) by means of the electric field and to
15 detect it after emergence from the electro-optically active medium (4), it being possible to determine the voltage V from the detected state of polarization,
~~characterized in that~~ wherein
a distance medium (2) is arranged between the two electrodes (3, 4), the
20 electro-optically active medium (4) being arranged with an effective thickness d1 and the distance medium (2) with an effective thickness d2 between the two electrodes (3, 4) and the effective thicknesses d1, d2 being chosen in such a way that temperature influences on the detected state of polarization of the light (5) are essentially compensated for.

2. (Currently Amended) The voltage sensor as claimed in claim 1, ~~characterized in that~~ wherein the effective thickness d_2 of the distance medium (2) and the effective thickness d_1 of the electro-optically active medium (4) are chosen in such a way that the influences of the temperature dependences of temperature-dependent material constants of the distance medium (2) and of the electro-optically active medium (4) on the detected state of polarization of the light (5) are essentially compensated for.

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3. (Currently Amended) The voltage sensor as claimed in claim 2, ~~characterized in that~~ wherein the temperature-dependent material constants are

- critical electro-optical coefficients (k),
- 15 - dielectric constants (ϵ) and
- thermal expansion coefficients (α).

4. (Currently Amended) The voltage sensor as claimed in claim 1 ~~or 2, characterized in that~~ wherein the effective thickness d_2 of the distance medium (2) and the effective thickness d_1 of the electro-optically active medium (4) are chosen in such a way that the influences of the temperature dependences of the dielectric constant ϵ_1 of the electro-

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optically active medium (4) of the dielectric constant ϵ_2 of the distance medium (2) and,

- if the distance medium (2) is not electro-optically active or the light (5) does not radiate through the distance medium (2): of the critical electro-

5 optical coefficient k_1 of the electro-optically active medium (4), and

- if both the electro-optically active medium (4) and the distance medium (2) are electro-optically active and light (5) is radiated through them: of the critical electro-optical coefficient k_1 of the electro-optically active medium (4) and of the critical electro-optical coefficient k_2 of the

10 distance medium (2),

on the detected state of polarization of the light (5) essentially cancel one another out.

5. (Currently Amended) The voltage sensor as claimed in claim

15 4, ~~characterized in that~~ wherein the following holds true:

$$d_1 \cdot [(\partial k_1 / \partial T) \cdot E_1 + k_1 \cdot (\partial E_1 / \partial T)] + d_2 \cdot [(\partial k_2 / \partial T) \cdot E_2 + k_2 \cdot (\partial E_2 / \partial T)] \approx 0$$
if the light (5) also radiates through the distance medium (2), and:

$$(\partial k_1 / \partial T) \cdot E_1 + k_1 \cdot (\partial E_1 / \partial T) \approx 0$$

if the light (5) does not radiate through the distance medium (2) or the latter

20 is not electro-optically active;

where E_1 is the electric field strength in the electro-optically active medium (4) and E_2 is the electric field strength in the distance medium (4),

and in particular where the aforementioned electric field strengths are approximated as

$$E1 \approx \epsilon_2 \cdot V / (\epsilon_2 \cdot d1 + \epsilon_1 \cdot d2) \text{ and}$$

$$E2 \approx \epsilon_1 \cdot V / (\epsilon_2 \cdot d1 + \epsilon_1 \cdot d2)$$

6. (Currently Amended) The voltage sensor as claimed in one
5 of the preceding claims, characterized in that claim 1, wherein the distance
medium (2) is transparent and of a solid state of aggregation, and in that
the light radiates through both the distance medium (2) and the electro-
optically active medium (4).

10 7. (Currently Amended) The voltage sensor as claimed in one
of the preceding claims, characterized in that claim 1, wherein the distance
medium (2) has a vanishing critical electro-optical coefficient k_2 and/or a
vanishing temperature dependence $\partial k_2 / \partial T$ of its critical electro-optical
coefficient k_2 , and in particular has a negligible temperature dependence
15 $\partial \epsilon_2 / \partial T$ of its dielectric constant ϵ_2 .

8. (Currently Amended) The voltage sensor as claimed in one
of the preceding claims, characterized in that claim 1, wherein a stack of N
elements of the electro-optically active medium (4) and N+1 elements of
20 the distance medium (2) is arranged between the electrodes (3, 4), N being
an integer where $N \geq 1$, and an element of the electro-optically active
medium (4) in each case being arranged between two adjacent elements of
the distance medium (2), the first and the last element in the stack being in

contact with a respective one of the two electrodes ~~(3, 4)~~ and, in particular, each of the elements being essentially cylindrical with essentially the same cylinder diameter.

5 9. (Currently Amended) The voltage sensor as claimed in claim
8, ~~characterized in that~~ wherein the elements of the electro-optically active
medium ~~(1)~~ have such an effective thickness and are arranged between
the electrodes ~~(3, 4)~~ in such a way that a deviation between the voltage
determined by means of the voltage sensor and the voltage V to be
10 measured is minimal.

 10. (Currently Amended) The voltage sensor as claimed in claim
8, ~~characterized in that~~ wherein the elements of the electro-optically active
medium ~~(1)~~ all have the same effective thickness $\delta_1 = d_1/N$, and ~~in that~~
15 wherein either

 (a) the elements of the distance medium ~~(2)~~ have an effective
thickness $\delta_2 = d_2/N$, but the outer two elements of the distance medium ~~(2)~~
in the stack have an effective thickness $\delta_2' = d_2/(2 \cdot N)$, or ~~in that~~ wherein
 (b) the elements of the distance medium ~~(2)~~ have an effective
20 thickness $\delta_2 = d_2/(N+1)$.

 11. (Currently Amended) The voltage sensor as claimed in ~~one~~
~~of the preceding claims, characterized in that~~ claim 1, wherein the

electrodes (3, 4) together with the electro-optically active medium (4) and the distance medium (2) are cast in silicone (15).

12. (Currently Amended) The voltage sensor as claimed in one
5 of the preceding claims, characterized in that claim 1, wherein the electrodes (3, 4) together with the electro-optically active medium (4) and the distance medium (2) are cast in silicone, the silicone in the region of the electrodes (3, 4), of the electro-optically active medium (4) and of the distance medium (2) being formed essentially in cylindrical or barrel-
10 shaped fashion with a diameter which is between 1.1 and 6 times, in particular between 2 and 4 times, as large as a maximum radial extent of the electrodes (3, 4).

13. (Currently Amended) The voltage sensor as claimed in claim
15 11 or 12, characterized in that , wherein the silicone (15) in the region of the electrodes (3, 4), of the electro-optically active medium (4) and of the distance medium (2), is formed essentially in cylindrical or barrel-shaped fashion, and the electrodes (3, 4) have electrically conductive voltage feeds (3b, 4b), which are formed essentially in rod-type fashion and are likewise
20 cast in silicone, the silicone (15) in the region of the voltage feeds (3b, 4b) being formed essentially in cylindrical fashion and having a smaller diameter than in the region of the electrodes (3, 4), of the electro-optically active medium (4) and of the distance medium (2), and, in particular, in that wherein the silicone has a shielding on the outside.

14. (Currently Amended) The voltage sensor as claimed in ~~one~~
~~of the preceding claims, characterized in that~~ claim 1, wherein the electro-
optically active medium (4) is crystalline BGO which is oriented with its
5 {001} direction parallel to the direction of propagation of the light (5), ~~in that~~
wherein the direction of propagation of the light (5) essentially runs along
the electric field generated by the voltage V, and in that the distance
medium (2) is fused silica.

10 15. (Currently Amended) A method for measurement of an
electrical voltage V, the voltage V being present between two electrodes (3,
4) arranged in a manner spaced apart from one another and generating an
electric field, light (5) being radiated into an electro-optically active medium
(4) arranged between the electrodes (3, 4), a state of polarization of the
15 light (5) being influenced in the electro-optically active medium (4) by
means of the electric field and the light being detected after emergence
from the electro-optically active medium (4) and the voltage V being
determined from the detected state of polarization,
~~characterized in that~~ wherein
20 a distance medium (2) is arranged between the two electrodes (3, 4), an
effective thickness d2 of the distance medium (2) and an effective
thickness d1 of the electro-optically active medium (4) being chosen in
such a way that temperature influences on the detected state of
polarization of the light (5) are essentially compensated for.